

# Solving Engineering Problems with Code

## ISE 150 (4 Units)

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Spring 2025

### Description

While teaching critical thinking skills, this class will use engineering examples as a platform to introduce a programming approach to problem solving.

### Objective

This course is an introduction to the Python programming language from an engineer's perspective. By the conclusion of this course, students will understand:

1. Core Python functional programming
2. Core Python object-oriented programming
3. Using Python for data manipulation

### Concepts

Programming fundamentals including variables, control statements, loops, functions and object-oriented programming.

### Prerequisites

None. This class is intended for students with no prior programming experience.

### Instructor

Ragheb Raad, raghebra@usc.edu

### Course

Justin Hougland, Sherry Xie

### Producers/TAs

### Office Hours

TBA

### Lecture / Lab

TTH 8am to 10am

### Textbook

**Optional:** *Head First Python, 2<sup>nd</sup> Edition*. Paul Barry. O'Reilly Media Inc. ISBN: 9781491919538.

This book is available through USC Libraries Safari account

(<https://libproxy.usc.edu/login?url=http://proquest.safaribooksonline.com>)

## Course website

All course material will be on BrightSpace

## Course Structure

Topics covered during lecture will be applied to about 7 homework assignments spread throughout the semester. All homework assignments must be completed *individually* and outside of regularly scheduled class meetings.

Regular class meetings will feature a 60-minute lecture followed by an in-class lab assignment. These “labs” must be completed *individually* and are due at the end of the class period. These “labs” will immediately apply material from the lecture and serve as an introduction to the other programming assignments.

There is a midterm and cumulative final exam in this course

## Grading

The following percentage breakdown will be used in determining the grade for the course.

Lab/Homework assignments	30%
Networking Assignments	5%
Participation	10%
Midterm exam	25%
Final exam	30%
<b>Total</b>	<b>100%</b>

## Grading Scale

The following shows the tentative grading scale to be used to determine the letter grade.

93% and above	A
90% - 92%	A-
87% - 89%	B+
83% - 86%	B
80% - 82%	B-
77% - 79%	C+
73% - 76%	C
70% - 72%	C-
67% - 69%	D+
64% - 66%	D
63% and below	F

The instructor reserves the right to change grading percentages and scale them the way they deem fit/necessary.

## Policies

### Lab assignments

Each lab assignment must be completely *individually*. There are no group projects in this class.

There will be lab assignments after most lectures. These assignments will be an immediate application of the material presented in lecture. These assignments will be graded as pass/fail. For credit on each lab you must complete and submit the lab before class time has ended. Each lab will contribute to your overall grade. There is no way to make up a missed lab.

## **Policies (continued)**

### **Homework assignments**

Each homework assignment must be completely *individually*. There are no group projects in this class.

Each homework assignment will include instructions, a due date, and can be found on the Blackboard site for this course.

It is your responsibility to submit your all homework assignments on or before the due date. Homework assignments turned in one day late will have 20% of the total points deducted from the graded score. Homework assignments turned in two days late will have 50% of the total points deducted from the graded score. After two days, submissions will not be accepted, and you will receive a 0.

All homework assignments must be digitally submitted through Blackboard except when otherwise specified by the course staff. Do not email homework assignments to the course staff.

Homework assignment questions should be posted to the online question forum. Questions about specific code should be private posts while general class questions can be public posts. Class time is for lecture and lab assignments only. Do not send any email to the instructor regarding homework assignments or ask specific homework questions during the lecture sessions. You are encouraged to attend office hours for homework related questions.

### **Participation**

When students enroll in this course, they are expected to actively participate in class discussions and make a commitment to attend regularly. Simply attending class is not enough; students are encouraged to contribute to the learning environment by asking relevant questions and engaging in discussions. While attendance policies do not provide rewards for attending class, they may impose penalties for non-attendance. Being late or missing class due to working on assignments is not an acceptable excuse. Students must arrive on time and fully prepared to participate in each class meeting. While there may be legitimate reasons for a student to miss class, excessive absences can hinder their ability to fulfill the requirements of the course. In such cases, the instructor may recommend that the student withdraw from the course, not as a punishment for missing class, but as an acknowledgment that the student may not be able to complete the course assignments due to their frequent absences.

**Note:** The instructor might ask the students to watch a video or read an article as a preparation for a certain class. While such an assignment will not be graded, not proceeding with it will lead to your inability to participate in the class discussion associated with it.

### **Two Networking assignments:**

Networking is a very important part of being a professional. The best place to network and meet other professionals is the classroom itself. Unfortunately, many students take classes where they barely – or even do not – meet anyone. These assignments will help you combat such an inconvenience. Throughout the semester, each student will be required to participate

in two networking meetings with their classmates (groups of 5 to 10). Each group will agree unanimously on a time and place where they will be meeting and just socializing. The duration should be at least one hour. A group picture must be taken. Each student will therefore send the group picture as evidence, and they will mention who was in the meeting and what did they do. More details on the deadlines and specificities will be mentioned in class. Groups have to be different for each of the two assignments.

### **Exams**

Make-ups are only allowed under extraordinary circumstances. Students must provide a satisfactory reason (as determined by the instructor) along with proper documentation. There are two exams: a midterm and a final. These exams are comprehensive of all topics covered.

### **Course material policy**

Do not reproduce, distribute, or post any assignment solutions or exams publicly without written consent of the instructor, as this will be considered an academic integrity violation. Most of the lecture notes and assignment instructions for this course are © 2022 Nathan Greenfield.

### **Incomplete and Missing Grades**

Excerpts for this section have been taken from the University Grading Handbook, located at <http://www.usc.edu/dept/ARR/grades/gradinghandbook/index.html>. Please see the link for more details on this and any other grading concerns.

A grade of Missing Grade (MG) “should only be assigned in unique or unusual situations... for those cases in which a student does not complete work for the course before the semester ends. All missing grades must be resolved by the instructor through the Correction of Grade Process. One calendar year is allowed to resolve a MG. If an MG is not resolved [within] one year the grade is changed to [Unofficial Withdrawal] UW and will be calculated into the grade point average a zero grade points.”

A grade of Incomplete (IN) “is assigned when work is no completed because of documented illness or other ‘emergency’ **occurring after the twelfth week** of the semester (or 12<sup>th</sup> week equivalency for any course scheduled for less than 15 weeks).”

## **Academic Conduct and Support Systems**

### **Academic Conduct**

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Section 11, Behavior Violating University Standards <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct/>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the Office of Equity and Diversity

<http://equity.usc.edu/> or to the Department of Public Safety

<http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>.

This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. The Center for Women and Men <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage [sarc@usc.edu](mailto:sarc@usc.edu) describes reporting options and other resources.

## **Academic Conduct and Support Systems (continued)**

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### **Support Systems:**

*Student Counseling Services (SCS)* - [\(213\) 740-7711](tel:(213)740-7711) – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. <https://engemannshc.usc.edu/counseling/>

*National Suicide Prevention Lifeline* - [1-800-273-8255](tel:1-800-273-8255)

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

*Relationship & Sexual Violence Prevention Services (RSVP)* - [\(213\) 740-4900](tel:(213)740-4900) - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

*Sexual Assault Resource Center*

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

*Office of Equity and Diversity (OED)/Title IX compliance* – [\(213\) 740-5086](tel:(213)740-5086)

Works with faculty, staff, visitors, applicants, and students around issues of protected class. <https://equity.usc.edu/>

*Bias Assessment Response and Support*

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

*Student Support & Advocacy* – [\(213\) 821-4710](tel:(213)821-4710)

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic.

<https://studentaffairs.usc.edu/ssa/>

*Diversity at USC* – <https://diversity.usc.edu/>

Tab for Events, Programs and Training, Task Force (including representatives for each school), Chronology, Participate, Resources for Students

## **Academic Conduct and Support Systems (continued)**

All submissions will be compared with current, previous, and future students' submissions using a code plagiarism identification program. If your code significantly matches another student's submission, you will be reported to SJACS with the recommended penalty of an F in the course.

You may discuss solutions to specific problems with other students, but you should not look through another's code. The code can be from an online forum or another student, the source is immaterial – all code submitted in this course must be your own. Do not share your code with anyone else in this or future sections of the course, as allowing someone to copy your code carries the same penalty as copying the code yourself.



# Solving Engineering Problems with Code

ISE 150 (4 Units)

## Tentative Course Outline

Note: Schedule subject to change

W	Topic(s)	Lab	Homework
1	Introduction		
	Interface		
2	Variables, printing	Lab 01	HW01 assigned (Due week 3)
	Input, randomness	Lab 02	
3	Booleans and conditionals, Modules	Lab 03	HW02 assigned (Due week 4)
	While loops	Lab 04	
4	More loops; Sequences;	Lab 05	
	In class lab	Lab 06	
5	Lists, tuples		HW03 assigned (Due week 6)
	Dictionaries, sets	Lab 07	
6	Functions	Lab 08	HW04 assigned (Due week 8)
	Functions	Lab 09	
7	Recursion	Lab 10	
	Recursion	Lab 11	
8	Review		
	Review	Lab 12	
9	Midterm – March 11	Lab 13	HW05 assigned (Due week 10)
	Surprise	Lab 14	
10	Search and Sorting	Lab 15	HW06 assigned (Due week 11)
	Pandas	Lab 16	
11	Matplotlib	Lab 17	
	Files	Lab 18	
12	Errors and Exceptions	Lab 19	
	Objects And classes		
13	Writing classes	Lab 20	HW7 assigned (Due week 14)
	In class lab	Lab 21	

<b>W</b>	<b>Topic(s)</b>	<b>Lab</b>	<b>Homework</b>
14	Inheritance	Lab 22	
	Inheritance	Lab 23	
15	Review	Lab 24	
	Review		
	<b><u>FINAL EXAM – as according to the final exam schedule, might do it last week instead if everyone agrees</u></b>		